

# **1,2,4-Trimethylbenzene Transformation Reaction Compared With Its Transalkylation Reaction With Toluene Over USY Zeolite Catalyst**

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## **Summary**

1,2,4-Trimethylbenzene (TMB) transalkylation with toluene has been studied over USY zeolite type catalyst using a riser simulator that mimics the operation of a fluidized-bed reactor. Reaction mixtures of 50:50 wt % TMB and toluene were used for the transalkylation reaction. The range of temperature investigated was 400-500 degrees C with time on stream ranging from 3 to 15 s. The effect of reaction conditions on the variation of the p-xylene to o-xylene product ratio (P/O), distribution of trimethylbenzene (TMB) isomers (1,3,5-TMB to 1,2,3-TMB), and values of xylene/tetramethylbenzene (X/TeMB) ratios are reported. Comparisons are made between the results of the transalkylation reaction with the results of pure 1,2,4-TMB and toluene reactions earlier reported. Toluene, which was found almost inactive, became reactive upon blending with 1,2,4-TMB. This shows that toluene would rather accept a methyl group to transform to xylene than lose a methyl group to form benzene under the present experimental conditions. The experimental results were modeled using a quasi-steady-state approximation. Kinetic parameters for the 1,2,4-TMB disappearance during the transalkylation reaction and in its conversion into isomerization and disproportionation products were calculated using the catalyst activity decay function based on time on stream (TOS). The apparent activation energies were found to decrease as follows: E-transalkylation > E-isomerization > E-

disproportionation.

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